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Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Souza, V. d., Cortez, E. A., & Carmo, T. G. d. (2017). Educational measures to minimize occupational hazards in the ICU nursing staff. *Revista de Pesquisa: Cuidado é Fundamental Online*, 9(2), 583-591. <https://doi.org/10.9789/2175-5361.2017.v9i2.583-591>

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Medidas educativas para minimizar os riscos ocupacionais na equipe de enfermagem da UTI

Educational measures to minimize occupational hazards in the ICU nursing staff

Medidas docentes para minimizar los riesgos laborales en el equipo de enfermería en la UCI

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How to quote this article:

Souza V; Cortez EA; Carmo TG. Educational measures to minimize occupational hazards in the ICU nursing staff. Rev Fund Care Online. 2017 abr/jun; 9(2):583-591. DOI: <http://dx.doi.org/10.9789/2175-5361.2017.v9i2.583-591>

ABSTRACT

Objective: To identify the occupational risks to ICU workers, as well as the risk factors; and to propose educational measures to those risks. **Methods:** This is an integrative review conducted on the Lilacs, BDENF and Medline databases, after the inclusion and exclusion criteria, six articles were selected. **Results:** The results indicated biological, chemical, ergonomic, physical and mechanical hazards, the presence of occupational risks and occupational risk factors that influence the routine and the development of the nursing team's work. Studies show few educational measures in order to mitigate these types of risks to workers. **Conclusion:** All occupational hazards are present in the ICU, but the ergonomic risk is responsible for the higher rates in the polls showing stress as a major consequence. Continuing education permeates the educational proposals to minimize occupational hazards.

Descriptors: Nursing; Occupational Health; Worker Health; Intensive Care Unit.

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RESUMO

Objetivo: Identificar os riscos ocupacionais associados aos trabalhadores da UTI, assim como os fatores de risco aos quais estão sujeitos; e propor medidas educativas aos riscos encontrados. **Métodos:** Trata-se de uma revisão integrativa realizada nas bases do Lilacs, BDENF e Medline, após critérios de inclusão e exclusão foram selecionados seis artigos. **Resultados:** Os resultados indicaram riscos biológicos, riscos químicos, riscos ergonômicos, riscos físicos e riscos mecânicos, riscos ocupacionais presentes e os fatores de riscos ocupacionais que influenciam na rotina e no desenvolvimento de trabalho da equipe de enfermagem. Os estudos apresentam poucas medidas educativas a fim de amenizar estes tipos de riscos aos trabalhadores. **Conclusão:** Todos os riscos ocupacionais estão presentes na UTI, mas o risco ergonômico é o responsável pelos altos índices nas pesquisas, evidenciando o estresse como sua maior consequência. A educação permanente permeia as propostas educativas para minimizar os riscos ocupacionais.

Descritores: Enfermagem; Saúde Ocupacional; Saúde do Trabalhador; Unidade de Terapia Intensiva.

RESUMEN

Objetivo: Identificar los riesgos laborales a los trabajadores de la UCI, así como sus factores de riesgo; y proponer medidas educativas a esos riesgos. **Métodos:** Se trata de una revisión integradora realizado en las bases de datos Lilacs, Medline y BDENF, después de los criterios de inclusión y exclusión, se seleccionaron seis artículos. **Resultados:** Los resultados indicaron riesgo biológicos, químicos, ergonómicos, físicos y mecánicos; están presentes riesgos ocupacionales y factores ocupacionales que influyen en la rutina y el desarrollo del trabajo en equipo de enfermería. Los estudios tienen pocas medidas educativas con el fin de mitigar este tipo de riesgos a los trabajadores. **Conclusión:** Todos los riesgos profesionales están presentes en la UCI, pero el riesgo ergonómico es responsable de las altas tasas en las pesquisas que muestran el estrés como una de las principales consecuencias. Educación continua impregna las propuestas educativas para minimizar los riesgos laborales.

Descritores: Enfermería; Salud Ocupacional; Salud del Trabajador; Unidad de Cuidados Intensivos.

INTRODUCTION

In a hospital setting, we find several sectors, each with its particular complexities. This research will focus on the Intensive Care Unit (ICU), which is a service of high complexity and it is considered an unhealthy workplace.

The ICU is an environment where sophisticated techniques and procedures are used to treat diseases with potential risk to life, bearing severe patients, in extreme situations, that still have a favorable prognosis to live, but need technical resources and specialized human personnel to aid in their recovery¹, therefore, it is an environment with a proven complex dynamic.

Patients in the ICU are critical, demanding a routine where the professional should have attention, skill, training, agility in the implementation of assistance, among others. In the ICU, the nursing care is uninterrupted to severe patients whose routine require the most of the intense care professionals.

The nursing staff in the practice of its profession is exposed to several types of risks such as physical, ergonomic, chemical, biological and accidental.²

The above risks can be described as follows: 1) Physical (noise, heat, cold, pressure, humidity, lighting, vibration, etc.); 2) Ergonomic (repetitiveness, weight lifting, bad posture and excessive pace of work); 3) Chemicals (substances, products or compounds that penetrate the worker's body); 4) Biological (bacteria, fungi, etc.); 5) Mechanical (falls, sharp objects); 6) Accidents (electricity, likelihood of fire or explosion).²

Thus, we define occupational hazards as all work situations that can disrupt the physical, mental and social balance of people, therefore, not only the situations that cause accidents and illnesses.³

Hence, occupational risks to which the nursing workers are exposed to can be characterized as physical, ergonomic, chemical, accidental and biological.⁴

Another problem related to occupational hazards that the nursing staff is exposed to are the risk factors that are also found in the ICU environment during the assistance provided by these workers.

Accordingly, the set of circumstances that may cause adverse effects such as death, injury, illness or damage to health is defined as a risk situation or factor.⁵ The risk factors that could cause injury to the production, quality, service provided and the health of nursing workers derive from physical, chemical, biological, ergonomic, psychosocial and accidental hazards.⁶

In addition to that, the ICU can constitute an offensive and traumatizing environment for customers and for those who work there, due to factors such as constant noise devices, emergency situations, lack of material resources and personnel, lack of preparation of the team in dealing with suffering and grief, conflicts of a personal nature within the team, among others.⁷

Reinforcing the fact that nursing workers are exposed at all times to risks and risk factors in their work environment.

Given this context, this research aims to: identify the occupational risks to workers in the ICU, as well as their risk factors; and propose educational measures to prevent the risks found from happening.

METHODS

This study is an integrative review, which rescues and summarizes previous research, concluding with results obtained in different studies.⁸

The location for data collection was the Virtual Health Library (VHL), sources such as LILACS (Latin American and Caribbean Literature in Health Sciences), Medline (Search Analysis Online System for Medical Literature), and BDENF (Nursing Data Base), from August 2014 to December 2014.

Six steps of the integrative review were covered, such as: 1) Definition of the subject for discussion for the study, hence the guiding question: how the working nurse should

guide the ICU workers based on occupational hazards and risk factors; 2) Establishment of the inclusion criteria (studies from the last five years (2009 to 2014), scientific articles, the following descriptors, nursing, health workers, occupational health and intensive care unit, and searches in the database described above); 3) Selection of the scientific studies found, so that they would serve the objective of this research; 4) Evaluation of the articles targeting its central objective; 5) Full reading of the selected studies; 6) Synthesizing and categorizing the information to meet the proposed objective.

In order to facilitate, the sample search was built on the PICO strategy (P = patient; I = intervention, C = comparison and O = outcome and/or results), it is possible to use only PIO, because the study did not intend to perform comparison. In this research P = intensive care unit, nursing; I = Prevention; O = causal factors, risks. The steps above can be better viewed in the Flowchart 1.

The level of evidence was used to systematize the strength of evidence of the selected studies, classified as: level 1 (strongly recommended action); level 2 (recommended action) and level 3 (little-recommended action).⁹

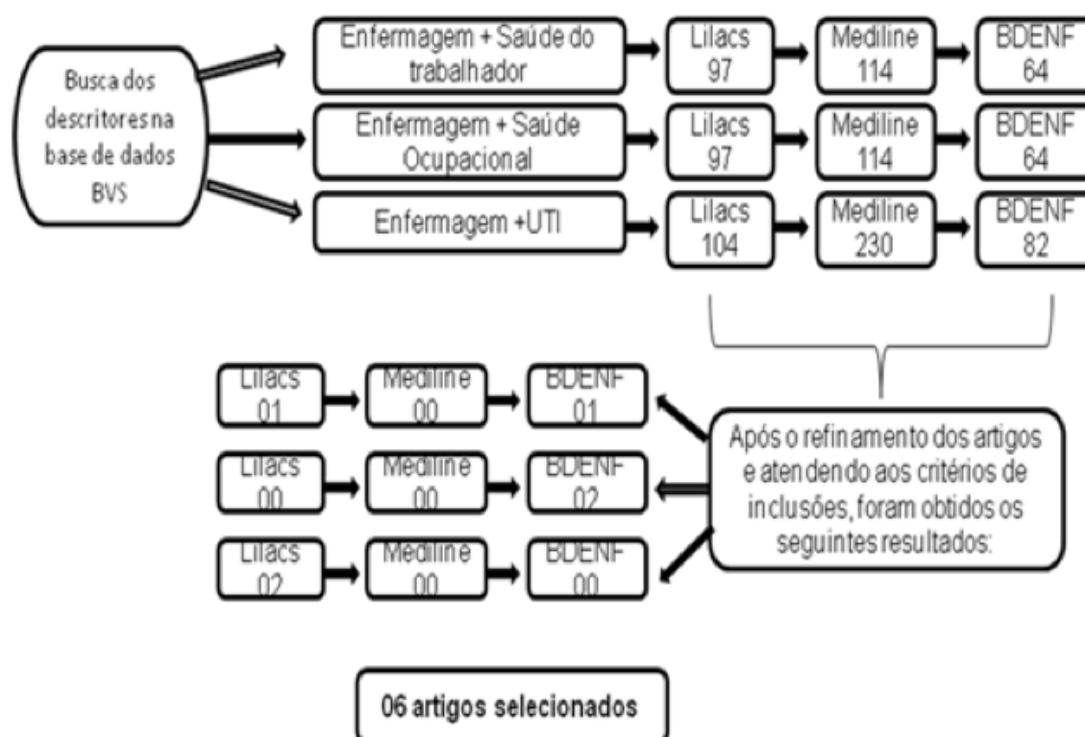
In the Table 1, below, we can quantify the publications found in the researched database with each descriptor isolated:

Table 1 - Descriptors search

Virtual Health Library			
DESCRIPTORS	LILACS	MEDILINE	BDENF
Nursing	3.937	42.896	3.154
Occupational Health	3.572	19952	502
Workers Health	3.572	19952	502
Intensive Care Unit	2.010	33.696	728

After the isolated search, the search was performed with the associated descriptors and the path traveled for the search is found in Flowchart 1.

Flowchart 1



RESULTS

In Table 2 are exposed the publications selected in this integrative review, which is set according to: place and year of publication, database found, job title, type and research approach, studies level of evidence and main results already separated according to the objectives of this review.

Table 2 - Periodic distribution for integrative review

PERIODIC/YEAR	DATABASE	TITLE	TYPE OF RESEARCH	NE	MAIN RESULTS		
					Occupational risks/ risk factors in the ICU	Educational Measures	
1	Revista Gaúcha de Enfermagem da UFSM ¹⁰ 2013	BDENF	Stress and Coping in adult and cardiologic intensive care nurses.	Descriptive Transverse Quantitative	3	The stress among nurses is significant, among the stressors are included: possible exhausting interpersonal interaction in the workplace that can affect professionals, family members and patients; and work overload. Risk factors are: impotence before the disease, need of dexterity and speed.	It does not address
2	Revista Escola de Enfermagem USP ¹¹ 2010	LILACS	Evaluation of the work context in intensive care under the view of work psychodynamics	Exploratory Transverse Descriptive	3	The evidenced occupational hazards were: physical, cognitive, psychological and ergonomic. The risk factors were classified as severe (rate of work- pressure, rigidity and daily tasks goals), moderate to critical (communication difficulty between management and subordinates) and low (noise, dissatisfied workers).	Development of safety and worker health policies to minimize the physical and ergonomic issues in the ICU.
3	Revista Baiana de Enfermagem ¹² 2010	BDENF	work: Evaluation of nurses in intensive care in the light of work psychodynamics	Exploratory Transverse Descriptive	3	Psychosocial risks are present in the day-to-day lives of ICU workers. The identified factors are: mental effort (in order to define complex situations; use of memory; look to signs of patients and monitoring equipment; overload in administrative activities) and healthcare and affective efforts (forms of affective reactions and feelings).	Development of actions to improve workers health and development of a more humane and supportive organizational system for these workers.
4	Revista de Pesquisa: Cuidado é fundamental online ¹³ 2009	BDENF	Nursing work and exposure to occupational hazards	Bibliographical Descriptive Analytical	3	The study shows that the occupational risks to which nursing is exposed are: biological, ergonomic, psychological and chemical. The factors attributed to these risks are: environment and poor working conditions; misuse or not use of IPE; double or triple work shifts.	It does not address

(To be continued)

(Continuation)

PERIODIC/YEAR	DATABASE	TITLE	TYPE OF RESEARCH	NE	MAIN RESULTS		
					Occupational risks/ risk factors in the ICU	Educational Measures	
5	Revista Escola de Enfermagem USP ¹⁴ 2009	LILACS	Stress among nurses working in an intensive care unit	Quantitative Descriptive Exploratory	3	In the study, ICUs were considered stress generating sources, by prolonged exposure of workers to difficult situations, excessive workload, intense contact with critically ill patients, high weekly working hours and night shifts. In addition to that, there is the lack of technical/scientific specific preparation.	It does not address
6	Revista Eletrônica de Enfermagem ¹⁵ 2009	LILACS	Occupational exposure of nursing professionals from an intensive care unit to biological material	Descriptive Exploratory	3	ICU workers are exposed to biohazards, the presented factors were: lack of experience, excessive working hours and the non-use of IPE .	Review of the strategies used in continuing education programs aimed at contributing to the professional's awareness about occupational hazards.

We emphasize that we were able to synthesize the articles in the table above, in order to highlight its main content. However, we note that the articles that are geared to the first two objectives of the study are: 01, 02, 03, 04, 05 and 06. As the articles 02, 03 and 06 contain the educational measures for the second objective of this review.

DISCUSSION

Occupational hazards and risk factors in the ICU

It should be noted that in the data analysis the ergonomic risk was evident in all the selected works, illustrating the constant presence of this type of risk in the ICU environment.¹⁰⁻¹¹⁻¹²⁻¹³⁻¹⁴⁻¹⁵

Most articles cite ergonomic risks, calling them, for example, psychological risks, and these risks represent the greatest factors for the health deterioration of these workers, in this scenario, stress stands out as the main factor caused by certain risk factors, such as excessive workload and activities overload.¹⁰⁻¹¹⁻¹²⁻¹³⁻¹⁴⁻¹⁵

Ergonomic risks arise from activities related to professional/patient that may interfere with the worker's psychophysiological characteristics to perform daily tasks at work. They are often found in the professional's poor posture, weightlifting (patient and equipment), excessive workload, etc. It is noteworthy that the ICU requires of the nursing staff increased attention to the advents occurred in the sector, demanding of the professional to be on alert at all times while exercising the profession.¹⁰⁻¹¹⁻¹²⁻¹³⁻¹⁴⁻¹⁵

As for the physical risks, the various forms of energy such as: noise, pressure, humidity, vibration, heat, ionizing and non-ionizing radiation are some agents that cause physical

hazards. It is noteworthy that within the environment of an ICU one can find a lot of noise, largely because of equipment, including the monitoring that is constant in patient care, moreover there is poor lighting and environmental air conditioning, due to the fact that the temperature is low according to the current legislation.¹⁰⁻¹¹⁻¹²⁻¹³⁻¹⁴

In the analysis of the studies it was also revealed that biohazard was quite evident, correlating the risk of accidents and biological materials.^{12-13,15}

With regard to biological hazards, these are linked to the exposure of workers to pathogens such as fungi, bacteria, bacilli, viruses, etc. These types of risk in an ICU are related to simple and complex procedures performed by the nursing staff in their patients. The human immunodeficiency virus (HIV), hepatitis B (HBV), hepatitis C (HCV) are considered the most important in accidental transmission.¹²⁻¹³⁻¹⁵

In studies the chemical and mechanical risks were also highlighted, these factors were less cited and had less depth, but presented quotations regarding exposure and risk factors.

Mechanical hazards are characterized by the handling of machines and work tools, therefore, defective equipment, inadequate materials storage, cutting working tools, abrasion or friction, inadequate tools, electricity and falls, etc can cause accidents with physical injuries to the worker.¹²⁻¹³⁻¹⁵

With regard to chemical risks, these are related to handled substances and products that can penetrate the body and can cause health problems, namely: chemicals, gases, fumes, smoke, dust. These agents may be absorbed through the airways, by ingestion and contact or absorption through the skin.¹²⁻¹³⁻¹⁵

In this regard, we note that the articles approached a little of each of occupational hazards and their risk factors, and the risk factors were very evident in the studies, confirming that nursing workers are exposed to risks in the exercise of their activities on a daily basis.

Finally, it is ratified that ergonomic risks factors (psychic) were highlighted in the studies as the main factor among the other described ones, being found in all selected articles.

Seeking to discuss this category it is noted that in scientific publications, most of the risks found in an ICU are related to the working conditions to which the nursing professionals are submitted, that is, ergonomic risks.¹⁶

In order to minimize or control occupational hazards, the Ministry of Labor created the Regulatory Norms (RNs) directed to workers, thus, some RNs were selected by relevance of this study, the following:

- **RN -9- Program for Prevention of Environmental Risks - PPER.**¹⁷

9.1.1 This Regulatory Norm (RN) establishes the obligation to design and implement, by all employers and institutions that admit workers as employees, the Program for Prevention of Environmental Risks (PPER), in order to preserve the health and integrity of workers by anticipation, recognition, evaluation, and consequently, control of the occurrence of environmental risks that exist or which may exist in the workplace, taking into account the protection of the environment and natural resources. (Brazil, 1994)

- **RN -15- Unhealthy Activities and Operations.**¹⁸

15.1.5 It is understood by "tolerance limit", for the purposes of this Norm, the concentration of maximum or minimum intensity, related to the nature and duration of exposition to the agent, which will not cause harm to workers' health during their working life. (Brazil, 2011)

- **RN -16- Dangerous Activities and Operations.**¹⁹

16.5. For purposes of this Regulatory Norm (RN) are considered dangerous activities or operations those performed with explosives subject to:

a) chemical or autocatalytic degradation;

b) action of external agents such as heat, humidity, sparks, fire, seismic phenomena, shock and friction. (Brazil, 1987)

- **NR -17- Ergonomy.**²⁰

17.1. This Regulatory Standard aims to establish parameters that allow adapting working conditions to the psychophysiological characteristics of the workers, in

order to provide maximum comfort, safety and efficient performance. (Brazil, 1990)

17.1.1. Working conditions include aspects related to lifting, transportation and unloading of materials, furniture, equipment and environmental conditions of the workplace and the organization of work itself. (Brazil, 1990)

17.1.2. To evaluate the adaptation of the working conditions to the psychophysiological characteristics of the workers, it is up to the employer to perform an ergonomic analysis of the work, addressing, at least, the working conditions, as set forth in this Regulatory Norm. (Brazil, 1990)

- **RN- 26- Safety Signaling.**²¹

26.1.1 Colors for safety must be adopted in establishments or workplaces in order to indicate and warn about existing risks. (Brazil, 2011)

26.1.2 The colors used in the workplace to identify safety equipment, delimit areas, identify pipes used for conducting liquids and gases and warn against risks, must meet the requirements of the official technical standards. (Brazil, 2011)

26.1.3 The use of color does not exempt the use of other forms of accident prevention. (Brazil, 2011)

26.1.4 The use of colors should be as reduced as possible, in order not to cause distraction, confusion and fatigue to the worker. (Brazil, 2011)

- **RN-32- Work Safety and Health in Healthcare Institutions.**²²

This Regulatory Norm (RN) aims to establish the basic guidelines for the implementation of protective measures to the safety and the health of healthcare workers, as well as those who work with the promotion and assistance regarding healthcare in general. (Brazil, 2011)

32.1.2 For the purpose of this RN, health services are considered any building destined to the provision of health care to the population, and actions related to promotion, recovery, care, research and teaching in health at any level of complexity. (Brazil, 2011)

It is noteworthy that to identify occupational hazards early on, implicates in a preventionist character related to diseases and work accidents, enabling a reduction in the occurrence of casualties.⁶

The following table 3 shows the occupational hazards and their risk factors.

Table 3 - Occupational risks and risk factors

Occupational risks		Risk Factors
Biological hazards	Viruses, bacteria, bacilli, fungi.	Improper disposal of materials, inappropriate use or non-use of IPE, agility in the execution of the activity .
Chemical hazards	Dust, fumes, gases, vapors, chemical substances.	Disinfection or sterilization of materials without the use or inappropriate use of IPE, inadequate physical spaces, poorly ventilated rooms, chemical mixtures.
Ergonomic risks	The intense physical effort, lifting and weight carrying, poor posture, the excessive pace of work, repetition.	The handling of the patient, patient transportation, arranging furniture and equipment, poor posture, physical and mental overload.
Physical risks	Noise, vibrations, ionizing radiation, non-ionizing radiation, cold, heat, humidity, electricity .	Alarms of monitoring equipment, air conditioning in the ICU environment, inadequate lighting, constant noise.
Mechanical risks	Defective equipment, inadequate storage of materials, sharp work tools, inadequate tools, electricity, crushing.	Activity overload, lack of training, tiredness, degree of attention required .

It is noteworthy that some articles¹²⁻¹³⁻¹⁵ relate occupational risks factors described as: accidents with sharp objects, working hours - biological hazards; physical posture of professionals at work, pace of work, physical effort of the team, stress - ergonomic risks.¹⁰⁻¹¹⁻¹²⁻¹³⁻¹⁴⁻¹⁵

In the ICU, the nursing staff is exposed during their work routine.

It should be noted that among some psychological risk factors in the intensive care setting, are included: physical environment (lighting and inadequate ventilation and excessive noise); relationship between professionals (non-cooperation); excessive workload (heavy workloads and little work experience); rapid onset action (requiring greater skill).⁷

Another observation is that the lack of material that sometimes requires improvisation and the use of inappropriate materials also afflicts nursing professionals.²³

With the need to develop activities in an ICU such as handling and transportation of the patient, rearrangement of equipment and furniture at the bedside, dispose of materials to be used on work posts, the nursing team becomes exposed to musculoskeletal disorders related to major physical efforts required on their job routine²⁴, which is an example of ergonomic risk.

The high number of procedures and interventions, the use of cutting-piercing materials, catheterizations, excessive workload, lack of training of some professionals, excessive tasks and reduced headcount are some occupational risk factors found.¹⁵

Reduced headcount, excessive work, stress, improper disposal of materials, urgency were some factors attributed to the occurrence of occupational exposure to biologic materials.¹⁵

The manipulation and improper use of personal protective equipment (PPE); splashes on the skin and eyes; drug inhalation during the administration of aerosol or spray medicines and through the medication maceration and mixture; direct or indirect accidental ingestion through the hands or splashes reaching the mouth, are some factors related to chemical hazards.²⁵

With this, we can see that the occupational hazards and their risk factors pose a threat to workers' health and thus compromise their physical and psychological performance to the achievement of nursing care.

Educational measures

Some selected studies included educational proposals, such as: knowledge of stress-provoking factors; review of the strategies used in continuing education programs; awareness of professionals regarding occupational risks; development of a more humane and supportive organizational design in occupational health action; improvements in the work environment in order to keep it healthier for professionals; educational measures that critique and problematize the reality of work and workers health actions.¹⁰⁻¹¹⁻¹²⁻¹³⁻¹⁴⁻¹⁵

It should be noted that the nurse should mediate the conflicting situations between the nursing team by fostering communication between professionals, identifying the triggers of occupational hazards in their led team, in order to minimize or reverse the situations of risk or other problems.

The study of the workplace is relevant, designed for targeting occupational risks in order to promote the development of preventive strategies by the managers of these workers .

Continuing education is a great triumph to minimize the problems encountered, as it is understood as a pedagogical and political way to produce knowledge routinely in health institutions through the practice of teaching and learning, from the reality of the service and its difficulties, and a choice to perform activities in new ways, with a resolution to promote reformulation and implementation of knowledge and strategies for the collective development of workers and work.²⁶

Lifelong learning strategies for employees regarding precautionary measures before biological agents, physical and chemical, reformulating occupational risk prevention policies, continuous evaluation of the workers' health, hospital environments and the development of risk map

based on studies cited are part of an intervention strategy to reduce risks in ICU.²⁴

The knowledge of the activities carried out by the nursing staff in the ICU can provide an improvement in the working environment and their workers. Thus, preventive measures are important, necessary and effective in reducing occupational hazards and their factors, fitting to the nurse to do its planning and implementation.

CONCLUSION

The studies showed that the nursing staff working in ICUs are exposed to various occupational hazards in their working environment .

Biological, physical, ergonomic, mechanical and chemical hazards were identified as present in the ICU .

As highlighted in the articles, the ergonomic risk is the most present in the everyday of these workers.

The presence of occupational risk factors is significant, the ergonomic risk factors were exposed in all studies, thus implicating in stress, excessive workload and intense work routine as a major cause of health problems.

This context favors the emergence of health changes, thus impairing the worker and the labor sector, tasks may accumulate by the absence of one worker and the extra work might be split among the other members of the team.

It is observed that there were few educational measures present in this integrative review, however, they focused on worker health policies, as well as in continuing education policy, and that educational measures are essential to minimize occupational hazards.

Thus, it is expected that this study can contribute to the knowledge of occupational hazards and the factors that expose the nursing staff in the ICU, so that the work of nurses can draw more effective measures to reduce these occupational hazards.

We highlight with this, the need for improvements in working conditions, training of these workers to act in a complex sector, the development of actions, strategies and specific measures to protect the worker's health in a way that enables the reduction of occupational hazards in the nursing team.

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Received on: 22/01/2015

Reviews required: No

Approved on: 15/06/2016

Published on: 10/04/2017

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